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RECEIVED
SEP 5 1995
SAUL T. SHAPIRO

28 August 1995

Mr. Saul Shapiro
FCC
1919 M Street, NW
Washington, DC 20554

Dear Saul:

I hope that you found the discussions during the *Digital Systems Information Exchange VI* forum in Washington on 15 August helpful.

Prior to the opening of the forum, a paper was distributed authored by Gary Demos who is a consultant to Apple Computer. The contents of that paper formed the basis of Dr. Norman's keynote to the forum. The points raised in his keynote address were reported in a press release under the IEEE banner. I was informed by IEEE staff that the press release was a condition of participation placed on the IEEE by Dr. Norman.

Dr. Norman went on to suggest that the FCC Advisory Committee on Advanced Television Service (ACATS) process was not complete as the various issues had not been thoroughly vetted and "the computer industry would have to be included in the standards process".

For your information, I have responded as SMPTE President to the IEEE expressing my views on the press release. SMPTE would not have been a cosponsor of the event had I known that a press release would be generated that contained information that was not useful to the process and did not represent a consensus of the individuals present.

Attached is a copy of my letter to Dr. Norman which attempts to correct some of the misunderstanding on his part that may have lead to the statements made in his keynote address and the subsequent press release.

I hope you find the information useful.

Sincerely,

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28 August 1995

Dr. Donald A. Norman
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Dear Dr. Norman:

I am responding to the press release "APPLE V.P. SCORES HDTV/ATV STANDARDS PROCESS AT IEEE-USA FORUM" issued under the IEEE banner. I was present at the forum and had an opportunity to discuss one of the points you raised at that time. I am pleased to take the time to address some of the other issues raised in the press release, and to explain how each of the concerns about the Grand Alliance system as expressed in your press release and in your comments before the Digital VI Forum has been demonstrated to have been resolved.

The press release states "Norman urged participants to look beyond the current focus on entertainment and the commercial model of broadcast TV to recognize that 'the Advanced Television Standards are really the Advanced Information Services Standards that will allow ATV to become a major, central part of the National Information Infrastructure (NII)'."

For your information, many of the individuals involved in the ACATS process, including some of the members of the Grand Alliance, recognized very early in the process that the ATV standard would constitute the wireless part of the NII and incorporated appropriate functionalities within the system. As an example, the original system offerings (sans one, the AD-HDTV system) did not provide for a packetized data structure with headers and descriptors. Such a structure is essential to accommodate the interoperability, flexibility, and extensibility required to "become a major, central part of the National Information Infrastructure". The Grand Alliance system, however, is based on packetized data with headers and does meet the requirements for interoperability, flexibility, and extensibility. Further, it was understood that the wireless member of the NII should interface cleanly with the wired NII media, particularly with a switched network environment. The Grand Alliance system, based on MPEG-2, is designed to interface cleanly with the ATM switched network environment.

The press release further states: "For advanced television to play an important role in the emerging NII, Norman argued that ATV

would have to be made fully computer compatible. For that to happen, he asserted that the computer industry would have to be included in the standards process and that standards must be based on quality and long-term flexibility rather than on the short-term cost-minimization strategy he claimed prevails in the television industry. 'What is expensive today, will be much less expensive tomorrow,' he said."

The Grand Alliance system also contains sufficient "tools" to provide a clean interface with computer imaging applications. The number of MPEG-2 imaging engines offered at SIGGRAPH, last month, demonstrates the acceptance of this standard by the computer industry.

My personal recollection is that representatives of the computer industry have been very much included in the standards process. The public record shows participation by representatives from Apple, DEC, IBM, HP, etc. in the process. As I recall, an Apple representative was a Vice-Chairman of one of the ACATS sub-groups. The public record does not support your statement that the computer industry has not been included but supports the opposite conclusion. Richard Wiley, Chairman of the ACATS, should be commended for his efforts to make the process "inclusive".

The Grand Alliance system does accommodate "long-term flexibility" as noted above, within the constraints imposed by a 6 MHz bandwidth broadcast channel, and the implications of a 19.2 Mbit/s data channel. The "cost-minimization" strategy is not a "short-term" issue, it is based on the need to develop a solution that provides services to the urban and rural economically disadvantaged and a mass audience, rather than serving an elitist, limited audience.

The press release reports "Norman outlined four technical considerations central to the presentation of computer graphics on ATV: interlacing; refresh rates; pixel aspect ratios; and allowance for transmission of data and code. According to the Apple Advanced Technology Group head, interlacing creates severe problems in joining ATV with NII services such as text and browsing. Similarly, much higher frame refresh rates -- at least 70 flashes per second -- are required on large screens to eliminate brightness flicker. He suggested a compromise standard of 24 frames/second, to allow for simple conversion of other schemes already in use and easy display of multiples up to 72 frames/second."

As I explained to you during the forum, the Grand Alliance is not a display standard, it is a transmission or transport standard. The contents of the transport can be displayed on a native display at what ever rate and scanning structure is appropriate to that display. Taking the above issues raised by you but not necessarily in the same order:

Capture Rate: The Grand Alliance system does allow for the transport of images captured

by 24 frames/second progressive scanning to be coded and transported in a 24 frames/second progressive scan data multiplex. The most efficient use of the data space would be to do so. In my conversations with service providers including the broadcasting community, I found no one who does not plan to avail themselves of this tool in order to optimize the utilization of the limited data space. There are some image sequences, such as sporting events, where the motion portrayal requirements can not be met at 24 frames/second. In those cases the Grand Alliance system provides progressive scanning at alternate rates of 30 and 60 frames/second. The computer industry has long supported display rate ranging from 60 Hz to 75 Hz and including 66 Hz and 72 Hz. There is no really "simple conversion" scheme to accommodate all of the computer standards. Further, human response to display brightness flicker is related to the application, screen size, ambient lighting and a host of other issues. Display manufacturers have learned to provide solutions that are application-cost effective. Limiting the transport to 24 frames/second and, thereby, distorting the temporal accuracy of the information transported is not a solution to the brightness-flicker problem.

Interlace: Interlace scanning would not need to exist if the data path were of unlimited capacity. But infinitely large data channels do not exist. As I explained at the forum, to make the captured image sequences fit in a limited data channel, some compression of the data is required. The standard method is to quantize the data representing the image information (increase the coarseness of the representation of the images such as using fewer bits per pel). Eventually, that technique produces very undesirable distortions of the images. The solution to this problem is to sub-sample the images (use fewer pels per image). Sub-sampling is well documented in the literature. Interlace is a very inexpensive and well understood sub-sampling technique. The Grand Alliance family of HDTV formats can be viewed as being progressive with an agreement on the sub-sampling standard to be adopted when the combination of high levels of both detail and motion (sporting events at 60 Hz) overwhelm the quantizer. By not designating a standard method of sub-sampling, consumer appliances would need to accommodate a broad range of sub-sampling restoration filters, unnecessarily increasing the cost of the appliance, and delaying the availability of service to the economically disadvantaged. Interlace need not conflict "in joining ATV with NII services such as text and browsing" as the browsing of sporting events would rarely accompany the reading of small text in motion, but individuals who regularly wish to do so could be accommodated by a display that converts the 60Hz interlaced images to 60 Hz progressive images.

The press release further reports: "In order to present text and data legibly, Norman maintained that screens must have higher resolution with square pixels, progressively scanned, and frequently refreshed. Finally, Norman noted that the current Grand Alliance proposal is not sufficient to deliver computer code or data with enough accuracy to be useful. He advocated a standard that allows the transmission of data by freezing the image on the screen and then using the normal image transmission period for data."

Square-pels: The Grand Alliance system originally contained a square-pel HDTV format (1280x720) and a non-square-pel HDTV format (1408x960). After listening to the concerns expressed by the computer industry, ACATS requested that both formats be square-pel. The 1408x960 format was changed to 1920x1080. As stated above, the Grand Alliance system provides a range of square-pel formats from 640x480 to 1920x1080 at image capture rates from stills through 60 Hz. (Again, the display refresh rate is at the discretion of the provider of the consumer appliance).

Higher-resolution: The 1080 line system approaches the resolution of 35 mm film and is adequate for presentation on all but the largest of theater screens. Given this information, I'm not sure why you feel that higher resolutions are required or are economically compelling.

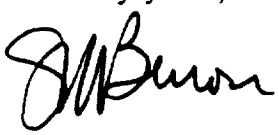
Progressive-scan: The above mentioned formats are all progressively scanned, but allow the use of interlace as a standard method of sub-sampling (only at 60 Hz) when motion/detail requirements so dictate. The SDTV end of the family of formats also accommodates the current television industry 4:2:2 standards. This segment of the family is not square-pel and is interlaced, but allows the transport of 60 years of archival material in the most efficient manner possible. A discussion of the effects of concatenated filtering that might occur depending on the native display in the consumer appliance would be lengthy, but it should be obvious that the most effective approach to this problem is not to make guesses as to what the final display might be, to allow for flexibility in future consumer appliances, and to transport the data in as uncorrupted a mode as possible by retaining the original data structure..

Internet-compatibility: The Grand Alliance has publicly demonstrated the excellent capability of the system to display computer generated scrolled text, as transported over the Internet, based on the 640x480 structure, and displayed on either the 1280x720 pro-scan display or a 1920x1080 interlaced display. A rudimentary knowledge of the relationship between a 480-line/frame progressive image and a 1080/2-line/field interlaced image should leave no question in anyone's mind that a simple, workable solution is available. I do not understand why you would believe that the solution does not work given the publicly demonstrated proof that it does.

Data-space: As I understand it, the Grand Alliance system provides for the handling of "stills" and using the data space for other forms of data. Glen Reitmeier, DSRC, has spoken at many forums explaining how the dynamic allocation of the data space provides a very adequate data channel. He has provided examples that demonstrate how the technique works not only when the image consists of stills, but when the motion/detail content is low. I'm surprised that both you and Mr. Demos have failed to acknowledge Glen's excellent contribution.

In summary, each of the concerns about the Grand Alliance system as expressed in your press release and in your comments before the Digital VI Forum has been demonstrated

to have been resolved.

I presume, of course, that the comments expressed in your keynote speech and the conclusions reached by Mr. Demos in the paper distributed at that event were made due to your being misinformed as to the facts, and I hope that the above notes help you in putting your conflicts to rest.

Sincerely yours,